"THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE'S PLACE IN FOREST DISEASE AND INSECT CONTROL"

by

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at the meeting of the
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I am happy to be present at the annual meeting of the Western Forestry and Conservation Association because it gives me an opportunity to learn more about your interest in the conservation of the forest resources of the Nation, as well as to discuss the work which the Bureau of Entomology and Plant Quarantine and the agencies we are cooperating with are doing in the control of forest pests.

It is generally recognized that forests constitute one of the major natural resources of the Nation, contributing vitally to the welfare of the public as a whole, as well as to that of those localities which depend on the forests for their existence. Any dangers that threaten its forests with destruction become of great importance to the National Government, the State, and the local agencies whose responsibility it is to protect the timber crops on these lands.

The three most destructive agents threatening the productive capacity of the forests are fire, insects, and diseases. Any one of these three agents may completely destroy the forests over extensive areas. Examples of such loss have been witnessed within the lifetime of many of those present at this meeting. Among these may be cited the destruction of the American chestnut by the chestnut blight, the 1910 fire which burned over extensive areas in the Inland Empire, and the damaging outbreaks of bark beetles.

The Governmental agency responsible for the investigation of insect problems and for leadership in the field application of both insect and plant disease control operations, in cooperation with interested agencies, is the Bureau of Entomology and Plant Quarantine. This responsibility is discharged, in the case of forest insects, by the research division titled "Forest Insect Investigations." This division of the Bureau determines control methods by research work and then on the basis of surveys recommends the application of these methods to those who own or are responsible for the administration of forest lands. The division of Plant Disease Control, on the other hand, is essentially a division concerned with control as its name implies. Among other functions of this division are included the development and application of control practices directed where feasible toward the control of the White Pine Blister Rust, which also is of immediate and vital interest to the industry which you represent.

History of Forest Insect Appropriations

Investigations of our destructive forest insects have been carried on almost from the beginning of entomological activities in the Department of Agriculture, in the late 1880's. It was not, however, until 1909 that Congress gave specific recognition to this work by appropriating $12,000 "for investigations of insects affecting forests." This original appropriation was gradually increased

to about $45,000 in 1912, $95,000 in 1929, about $243,000 in 1932, and the appropriation is $253,000 for the current fiscal year.

At the present time we are spending nearly $140,000 in the Western States, maintaining four laboratories, one at Berkeley, California; one at Portland, Oregon; one at Coeur d'Alene, Idaho; and one at Fort Collins, Colorado. We hope eventually to have another to establish closer contact with the forested areas of the southwest in New Mexico and Arizona.

History of Control Work

The Bureau utilizes a considerable portion of its forest insect funds for making examinations and conducting surveys on Federally and privately owned lands, at the request of the agency responsible for the protection of those lands. It assigns entomologists to aid with technical advice on large control operations. This work is done in accord with understandings with the various cooperating agencies, which include the Forest Service, the Bureau of Indian Affairs, and the National Park Service of the Department of the Interior.

The first control project against bark beetles was initiated in the Black Hills National Forest in South Dakota in 1906 against an extensive and aggressive outbreak of the Black Hills beetle. Twenty-seven hundred dollars were expended in this first effort which succeeded locally but was not extensive enough to check the outbreak as a whole. Gradually the expenditures for control increased, and as the effectiveness of this work was demonstrated, more funds were made available for this type of protection. Prior to 1921 expenditures for bark beetle control by the Forest Service, National Park Service, and Bureau of Indian Affairs were made from any source available. About 1921, with the realization of the tremendous losses in southern Oregon and northern California, funds were definitely appropriated by Congress for forest insect control work by the Forest Service and Bureau of Indian Affairs, and three years later for the National Park Service. The amounts available have varied from $10,000 to $20,000 per year for the Bureau of Indian Affairs, from $50,000 to $125,000 for the Forest Service and from $20,000 to $25,000 for the Park Service.

Up to and including the fiscal year 1930, approximately one million dollars had been spent in control work on Federal lands and $250,000 by private owners on cooperating projects. A few years later a tremendous increase in the extent of control work resulted from the establishment of the Civilian Conservation Corps. With this labor supply available it was possible to carry protection to less valuable stands for which no direct appropriation had been obtained previously.

Up to and including the fiscal year 1937, close to three million dollars have been expended on Federal lands through the agency of the CCC and nearly $800,000 in cash has been provided by private operators for the control of destructive bark beetles on private lands. Of the amount spent on Federal lands, more than half has been expended on National forests, and the remainder on Indian lands and National Parks respectively.

Results of Control Work

A candid appraisal of the results secured from the use of labor provided by the CCC and valued at some three million dollars, which has been employed

in the control of tree-killing bark beetles on Government properties, permits the definite conclusion that the value of the timber saved through this work has been worth a great deal more than the total expenditures put into the control work. It is believed the expenditure would be justified on timber values alone. However, the benefits of the control work in areas where the esthetic and recreational values were predominant, although not easily expressed in monetary terms, have been tremendous.

The control methods used in this work must vary with the habits of the insects and the character of the timber. In general, some methods of felling or barking and burning have proven to be the most practical and economical. On the other hand, modifications for special conditions have permitted tremendous savings. For example, the use of a sun-curing method against Mountain Pine beetle infested lodgepole in the Crater Lake National Park cut the cost to one-fourth of that of the barking and burning method. In the National forests of Idaho, Utah and Wyoming, development of a special means of spraying oil on the trunks of lodgepole pines and then setting fire to the standing trees reduced treating costs from a dollar and a half or two dollars per tree to fifty cents. More recently considerable experimentation has been conducted in the use of chemicals. Certain penetrating oils have been found effective when sprayed on the barks of the felled trees. This method has permitted extension of control work through the summer season when the fire hazard was great and burning methods impossible of use. The introduction of chemicals into the sapstream of infested trees has been used successfully against infestations of the Mountain Pine beetle in white pine in Idaho and Montana. It may prove possible to extend the use of this method and permit the salvage of the wood years later.

Unfortunately, one of the greatest drawbacks in bark beetle control has been the loss of the lumber in the tree which is treated. Usually the cost of control is greater than the actual lumber value of that particular tree and benefits of the control work must come through the saving of timber values in other unattacked trees on nearby areas through the prevention of the spread of the infestation. For this reason a great deal of attention has been devoted by our entomologists in the last few years to the use of so-called "salvage methods" of control. The Forest Service and private owners have cooperated heartily in this work and a number of incipient outbreaks have been controlled through local use of the timber, and large scale salvage operations have been cooperatively undertaken on some of the more chronic types of infestation, such as exist in the yellow pine stands of eastern California.

Adequate Surveys - A Key to Prevention

The old adage "an ounce of prevention is worth a pound of cure" applies most forcibly in the control of forest insect outbreaks. It is obviously far more practical and economical to stamp out these outbreaks in their incipient stages before they reach tremendous proportions involving millions of acres, and before hundreds of thousands of trees become infested.

The Bureau of Entomology and Plant Quarantine has long been advocating detection surveys and prompt and thorough control as the basis of adequate protection of our reserves of mature timber, and of our recreational and primitive areas. Gradually we have been increasing the effectiveness of these surveys aimed at the detection of outbreaks in their incipient stages. Even though the

land-managing agencies have heartily cooperated both with funds and personnel, we still fall far short of meeting this need.

In these cooperative activities more than 6,000,000 acres of forest were examined last year for bark beetle infestation. In addition to numerous recommendations made verbally or by letter, eighty-three reports presenting data and recommendations as to the status and need for control on forested areas were prepared and submitted to land-managing units. Fifty-one or about two-thirds of these reports were submitted to the Forest Service, eleven to the Park Service, one to the Indian Service and twenty to private owners or organizations. The recommendations included in these reports advised control work on approximately 750,000 acres.

Volume and Character of Timber and Need of Protection

There are two distinct classes of timber lands needing protection from insect pests - those where a present or future commercial value is the chief consideration and those where esthetic values are predominant. The commercially valuable timber includes that on lands of the National Forests, Indian Reservations and public domain. The timber needing protection because of its esthetic values includes that lying in the National Parks and on designated recreational areas in the National Forests.

Forest Service and Indian Service estimates indicate that their commercial timber in which they have reason to fear bark beetle outbreaks including pine, spruce, and Douglas fir, totals approximately two hundred billion board feet.

Those lands needing protection because of recreational or esthetic values in the National Parks and National Forests total around four million acres. All these stands should be covered with surveys of varying degrees of intensity every two or three years, depending on the hazard involved.

Defining Areas of Bark Beetle Hazard for Prevention of Losses through Control or Selective Cutting

In an effort to meet the insistent call for help from the lumbermen suffering tremendous losses in their Ponderosa pine holdings in eastern California, we have initiated a so-called hazard classification of the east side timber areas. These losses have amounted in some cases, over considerable areas, to over fifty percent of the volume of the stand in the past fifteen years. Direct control has been unsatisfactory on some of the poorer sites, for it is very expensive and much high-grade lumber goes to waste as the beetles usually select the finest trees.

This hazard survey groups the timber stands into five classes, varying from stands in which the losses are less than the annual growth to those areas where from forty percent to fifty percent or more of the volume of the timber has been destroyed in the last decade. On all these classes we are recommending selective utilization of the high risk trees insofar as it is economically possible. With the easy logging chances of this region and modern developments in machinery, much can be done in this respect. Furthermore, our entomologists have perfected a simple tree classification which permits the detection and marking of those trees most susceptible to bark beetle attack. Direct control

appears to be effective but is recommended only in those hazard classes where losses are least and then only as an emergency measure against rapidly increasing infestations. Preferably control should be combined as a control and salvage operation so as to offset as far as possible the cost of control which may vary from four dollars to five dollars per thousand feet. In those hazard classes where losses are highest, there seems no alternative but recognizing this fact and adopting rapid utilization so as to remove the timber ahead of the beetles.

To summarize the situation with respect to bark beetles, this Bureau is carrying on control investigations and making surveys to improve control methods and to determine the location of potential damage. This information is made available to timber owners affected.

Recommendations based on recent surveys of six million acres have resulted in advising control work on approximately 750,000 acres of public and private forest lands. This control work has not yet been started.

Field operations involving labor to an estimated value of some $3,800,000 have been carried on by public and private agencies since 1930. The control measures are practical and reasonably economical, the cost varying from fifty cents to two dollars per tree, this cost being offset in part by the value of the salvaged lumber.

Introduction and Spread of Blister Rust

The most injurious and threatening of the tree diseases in the West today is the white pine blister rust. This destructive disease was first discovered in 1921 in the State of Washington and in British Columbia where it had apparently existed since 1910. It was found in the Inland Empire in 1927, although it seems to have first reached that region in 1923. Spread of the disease continued southeastward in Idaho and Montana, to within twenty miles of Yellowstone National Park and southward along the mountains of western Oregon into California. The outstanding event in the spread of this disease during the past year was its discovery on Ribes throughout the northern quarter of California. Diseased Ribes were found about 120 miles south of the Oregon border both in the Coast Range and in the Sierra Nevada.

The available evidence indicates that the sugar pine may be even more susceptible to blister rust than are either the western white pine or the northern white pine of the eastern United States. The sugar pine forests are plentifully supplied with wild Ribes growing in association with this species, and the discovery of the disease on many of these bushes during the past year, combined with the virulence with which the rust was found attacking sugar pine in Oregon last season, indicates that the disease will be able to spread destructively under the climatic and forest conditions found within the range of the sugar pine. A small area of sugar pine near Panther Mountain, Oregon, discovered last year showed that the rust was killing sugar pines eight to ten inches in diameter, within a period of approximately ten years after it had reached the locality. This rate of destruction is even more rapid than the blister rust shows in the western white pine region. The disease was attacking trees of all sizes and was killing the smaller ones quickly. The larger ones take longer to kill but eventually they also succumb.

Meanwhile, extensive surveys have been carried on in the Inland Empire during the past two years. In 1936 about four percent of the young white pine in the Clearwater and St. Joe National forests in northern Idaho were visibly infected with blister rust, and in other sections of the western white pine forest area of the Inland Empire infection varied from two-tenths of one percent to one percent. This year extensive surveys on the St. Joe National forest showed thirteen percent visible infection, over three times as much as the previous year.

Development of Control Methods and Plans

Since the discovery of the white pine blister rust in the western United States, the Department has undertaken to locate and keep track of the spread of the disease from year to year, to locate and map the valuable commercial five-needled pine areas that should be protected from the disease, to develop practical control measures for the forest regions involved and to secure the application of these measures as rapidly as possible. It was found that the destruction of the currant and gooseberry plants growing among and near the pines and the continued maintenance of a Ribes-free condition thereafter, provided a completely practicable and successful measure of protection and that usually the value of the growing forest would justify the cost.

Progress of Control in the West

After feasible control measures were developed and demonstrated, the Department in 1928 undertook the field application of control measures on a small scale on selected areas in the western white pine region of Idaho and adjoining states. These stands included the best of the white pine sites on which it was desired to continue the production of western white pine indefinitely and involved areas totalling two and three-quarter million acres. Nearly two-thirds of this area has now been covered at least once. The Ribes on one million six hundred thousand acres had been initially eradicated by the end of 1936. Of this acreage, about fifty-five percent was on the National Forests, about fourteen percent on state lands, and about thirty-one percent on private lands. The CCC was also utilized in the past few years by the Forest Service for control work insofar as such labor was available. About 120,000 additional acres were covered in 1937, but the totals classified by ownership are not yet available.

Meanwhile, it was foreseen that the disease would sooner or later spread southward through western Washington and attack the sugar pine forests of southern Oregon and California. Practical control measures were therefore developed for this region and they have been applied as rapidly as funds were available. There are about two and three-quarter million acres in the white and sugar pine control areas recommended for Oregon and California of which about one and one-half million acres are in Federal ownership in the National Forests, National Parks, public domain and the so-called O and C revested lands. About one and one-quarter million acres are in private ownership and about 17,405 acres are owned by the State of California. The Ribes have been eradicated on about one-fourth of the valuable stands in the sugar pine region. Up to the end of 1936, over half a million acres have been worked initially; of this acreage, forty-three percent is in the National Forests and fifty-seven percent consists largely of private and State property. A total of about 65,000 acres of sugar pine, Federal and private, was initially protected in 1937.

Financial Support

The general application of control measures in the West was originally undertaken in 1928 in cooperation with state and private owners, and later in cooperation with the Forest Service. Small Federal and State appropriations and contributions from private agencies made possible only limited progress during the early years of this work, and with the advent of the depression, private agencies have contributed little or nothing in the way of funds for control work.

The more rapid accomplishments of recent years have been made possible by greatly expanding the cooperative programs previously undertaken, through the use of substantial allotments of emergency funds. Such net allotments to the Bureau of Entomology and Plant Quarantine in the fiscal years 1934 and 1935 totaled $2,016,520; in the fiscal year 1936 amounted to $4,407,804; and in the fiscal year 1937 were $2,904,625. It is probable that Bureau expenditures for blister rust control in the current fiscal year from emergency funds will total about $1,500,000. These figures do not include substantial appropriations and allotments to the Forest Service for control work on National Forest land.

It should be understood that this work has been carried on in some thirty states throughout the northern part of the country, but that half of the sums named were expended in the western region. During both the last two summers the amount of this type of work which could be carried out in the West has been definitely restricted by the amount of relief labor available, since emergency allotments must be devoted primarily to giving employment to persons registered on the relief rolls of the various states.

Initial Work Remaining to be Done

When we thus examine the present status of the blister rust control situation, we find that at present about one million acres of western white pine remain unprotected in northern Idaho, eastern Washington, and western Montana. It would be desirable to complete initial Ribes eradication in this region as soon as possible, preferably within two years.

In California and Oregon, more than two million acres of predominantly sugar pine forest remain unprotected in the National Forests and in privately-owned and state-owned tracts. In addition, important unprotected stands of sugar pine in the Lassen, Yosemite and Sequoia National Parks are of value for recreational use. Pre-eradication surveys of these National Park stands are now in progress, the work being done by the Bureau in cooperation with the National Park Service.

In the sugar pine and white pine areas of California and southern Oregon, widespread damage has not yet occurred since the disease has arrived there so recently. It is believed that the tremendous losses now threatening could be avoided. This would mean, in addition to the necessary rework, provision for initial Ribes eradication on 334,000 acres of land each year for six years on public and private property outside the National Parks.

Extent of Federal Responsibility

This group is interested in the extent to which the Federal Government should assume the costs of part or all of the insect control and blister rust control program. The relationship of the Federal Government to the protection and management of privately owned forest holdings is a question of great public significance and one which the public and Congress must finally determine.

In broad outline, those features of pest control which are already recognized as definitely involving responsibility of the Federal Bureau of Entomology and Plant Quarantine include:

1. Preventing the introduction of foreign insect pests and plant diseases, many of which have already cost this country heavy losses and expense.

2. Undertaking the control or eradication of introduced foreign pests of more or less recent and limited establishment in the United States through the introduction of parasites and predators and the inauguration of such extermination or control programs as are appropriate in each case.

3. Carrying on investigations to develop practicable and economical control measures which can be applied by private owners or the agencies administering public lands.

4. Coordinating and assisting in the direction of actual control of insects and plant diseases attacking Federal property, especially where such pests may spread to private holdings.

5. In cooperation with the States and individuals and associations providing for the control of infestations on private property where damaging spread to publicly-owned tracts may occur.

Relating these principles to our immediate problem, it is clear that the field control of native bark beetles is a recognized function of public activity only where such infestations occur either in forests that are publicly-owned or in privately-owned tracts so situated that the insects constitute a real threat of damage to public property.

In the case of blister rust control we are dealing with an introduced disease but one which is now relatively widespread in distribution. It is my own feeling that the ownership of the land concerned is a factor in the consideration of this question also. Of the funds needed for the Inland Empire, if a complete program of protection is to be carried out, approximately sixty-five percent would be expended on land in National Forests, in State Forests and on the public domain; that is, in forests to which the public holds title. The remaining thirty-five percent would be required for the initial protection of all the remaining private land.

The best estimates I have been able to obtain indicate that two hundred and eighty thousand acres of this privately owned unprotected forest in the Inland Empire is so intermingled with Federal land that the presence of blister rust on Federal holdings would menace these private holdings. The reverse is equally true, and the protection demands a fully cooperative program of control.

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Similarly, in the sugar pine region, in case a complete six-year program were adopted, the work would need to be fully cooperative, although the Federal interest seems to be the larger as regards acreage.

It is my feeling that a definite policy can be recommended which contemplates planning, directing and coordinating the protection of the Federal holdings and of the closely intermingled private tracts, the Federal responsibility to be carried out at Federal expense.

It is my own belief that the Department hould not commit itself with respect to the question of the Federal Government assuming part or all of the financial responsibility of protecting private forests. Such work very materially benefits the owners even though these benefits secondarily react favorably on the public welfare. We are now cooperating with the State of Idaho in the protection of State-owned lands on roughly a 50-50 basis. If it is finally determined that the future of the privately-owned forests is of such public importance as to justify the use of Federal appropriations in assuming all or part of the cost of protecting them against blister rust, we shall of course be glad to carry out such phases of the work as are assigned to us and to cooperate fully in all other phases. But consideration of this question involves a matter of fundamental fiscal policy which the fiscal agencies of the Government should have clearly before them before formulating a decision.

During the past few years we have provided for the employment of relief labor on private land as an unemployment measure where such work seemed convenient and appropriate in connection with the protection of public holdings in the vicinity. It appears most improbable that relief labor and CCC camps alone can be relied upon for carrying out this future program. Not enough able-bodied men have been found with relief status or as CCC enrollees in the West during the past two years to fill our labor requisitions on emergency allotments. In case regularly appropriated public funds are to be made available for the specific purpose of the protection of forest land from a tree disease, those responsible for making public policy must determine whether such appropriations shall be used solely for work on Federal forests and on intermingled private land where valuable public property is at stake, or whether the public has a sufficient interest in the more or less distinct privately-owned stands to provide also for their protection against blister rust.

This Bureau is thus prepared to recommend the continuance of forest insect investigations and surveys; provision for bark beetle control on or threatening Federal property; provision for the protection of publicly-owned forests from blister rust by means of Ribes eradication on such forests; and provision for planning, technical advice, leadership, and coordination for the pest control programs carried out by both public and private agencies.

But the question of field control of pests on private property in cases not involving a threat to public forests, except for surveys of disease and insect threats and abundance, is a matter of policy not within the functions of the Bureau to decide, but one which must be determined by policy-making bodies.

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